# Assessment Annotations
# for the Curriculum Frameworks

# Mathematics

## Grades 4, 8, and 10
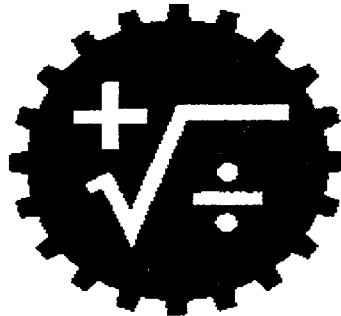
# MATHEMATICS- ASSESSMENT ANNOTATIONS

## For The

## Mathematics Curriculum Frameworks

The attached document provides supplemental assessment information to *Missouri's Framework for Curriculum Development in Mathematics K-12.* Contained within this assessment supplement are annotations that should be useful in understanding state and local responsibilities in assessing curriculum at the fourth, eighth, and tenth grade levels. This document indicates appropriate content and process specifications that should be useful in establishing curricula that prepares students to be proficient in mathematics.

Since the fourth and eighth grade benchmarks were established by the Framework's design, the column labeled, "What Students Should Know," establishes content that is appropriate for state testing. In addition, at the fourth, and eighth grade, the column labeled "What Students Should Be Able To Do" indicates appropriate processes for assessment. The last column labeled "Assessment Notes" further clarifies whether these processes are best assessed at the state or local level. If the phrase " Grade ( 4 or 8) state assessment" is shown'then this indicates that this process may be tested on the state mathematics examination at the indicated grade level.

Because benchmarks were not explicitly indicated at the tenth grade, the assessment notes provide information for both the "To Know" and "To Do" columns. The assessment notes indicate whether the content and processes are appropriate for assessment at the tenth grade on the state examination. Under the " Know" and "Do" categories in the assessment notes column, if the notation "Grade 10 state assessment" is indicated then this identifies content and processes that may be assessed at the state level. Under the " Do" of the assessment notes, process items are classified on whether these are assessed at the state level or better assessed at the local level. The notation "Beyond 10th grade state assessment" indicates material that students may or may not have covered at this point and therefore is not tested at the state level.

All of the benchmarks that were identified by the notation, "Grade (4, 8, or 10) state assessment," will not necessarily appear on a state test in any given year. The number of test items developed to access mathematical content and processes may vary from year-to-year. Only Framework pages that required assessment notes are provided within this document which results in the skipping of some page numbers.

| What All Students Should Know | What All Students Should Be Able To Do | Fourth Grade Assessment Notes |
|---|---|---|
| | NOTE: Each item in this column is designed to address several elements of "what all students should be able to do." | |
| *By the end of grade 4, all students should A-now* | By *the end o/grade 4, all students should be able to* | |
| *I.* Strategies to collect data. | a. collect, organize, and describe data through the use of technologies and other resources (NCTM Standard 11; MO 1.1, 1.3, 1.4, 1.8) | Do |
| | | a. Local assessment |
| 2. Strategies to organize data. | | b. Grade 4 state assessment |
| 3. Different ways of displaying data. | b. construct, read, and interpret displays of data through verbal, nonverbal, symbolic, and graphic forms (NCTM Standard 11; MO 1.5, 3.3, 3.6, 4.1) | c. Local assessment |
| 4. The appropriate display of data. | | d. Grade 4 state assessment |
| 5. The appropriate use of technology. | c. solve problems that require collecting and analyzing data (NCTM Standard 11; MO 2.3, 3.2, 3.3, 4.3) | |
| | d. explore concepts of chance (NCTM Standard 11; MO 1.6, 1.7, 4.3, 4.7) | |

| What All Students Should Know | What All Students Should Be Able To Do | Eighth Grade Assessment Notes |
|---|---|---|
| *By the end of grade 8, nil students should know* | NOTE: Each item in this column is designed to address several elements of "what all students should be able to do." | |
| | By *the end of grade 8, all students should be able to* | |
| 1. Standard measures of central tendency. | a. develop, analyze, and explain methods utilized to collect, organize, and describe data (NCTM Standard 10; MO 1.1, 1.4, 1.8, 2.1) | Do |
| | | a. Local assessment |
| 2. Methods to analyze data. | | b. Grade 8 state assessment |
| 3. Methods of representing analyzed data. | b. make, read, and interpret multiple representations including tables, charts and graphs of data (NCTM Standard 10; MO 1.5, 1.8, 3.3) | c. Grade 8 state assessment |
| | | d. Grade 8 state assessment |
| 4. Similarities and differences in theoretical and experimental probabilities. | c. formulate, predict, and defend positions taken that are based on data collected (NCTM Standard 10; MO 1.2, 1.4, 2.1, 3.7) | e. Grade 8 state assessment |
| | | f. Local assessment |
| 5. The appropriate use of technology. | | |
| | d. analyze information and arguments that are based on data collected (NCTM Standard 10; MO 1.7, 3.4, 3.6) | |
| | e. investigate the power of making decisions based on statistical methods and the applications of probability in the real world (NCTM Standard 10; MO 1.3, 3.2, 4.3, 4.7) | |
| | f. use computers, graphing calculators, and/or other forms of technology to enhance understanding of numbers, data, and the resulting analysis (NCTM Standard 10; MO 1.4, 2.7) | |

| What All Students Should Know | What All Students Should Be Able To Do | Eighth Grade Assessment Notes |
|---|---|---|
| | g. develop and execute experiments or simulations to predict and determine probable outcomes (NCTM Standard 10; MO 1.2, 1.3, 3.1, 3.6)<br><br>h. investigate sample spaces to predict probable outcomes and how these predictions affect the decision-making process (NCTM Standard 10; MO 1.3, 1.7, 1.10, 3.6)<br><br>i. investigate appropriate applications for experimental and theoretical probabilities (NCTM Standard 10; MO 1.7, 3.8, 4.7) | Do<br><br>g. Local assessment<br><br>h. Grade 8 state assessment<br><br>i. Grade 8 state assessment |

| What All Students Should Know | What All Students Should Be Able To Do | Tenth Grade Assessment Notes |
|---|---|---|
| *By the end of grade 12, all students should know* | NOTE: Each item in this column is designed to address several elements of "what all students should be able to do." | |
| 1. Statistical measures of central tendency, randomness, variability, and correlation. | *By the end of grade 12, all students should be able to* | |
| 2. Appropriate use of theoretical and experimental probabilities. | a. interpret and summarize data from charts, tables, and graphs that appear in real-world situations (NCTM Standard 10; MO 1.1, 1.8) | **Know**      Do<br><br>1. Grade 10 state assessment    a. Grade 10 state assessment |
| 3. The process required to design and conduct a survey or experiment. | b. apply curve-fitting to make defendable predictions (NCTM Standard 10; MO 1.4, 2.7, 3.2) | 2. Grade 10 state assessment    b. Beyond 10th grade state assessment<br><br>3. Grade 10 state assessment    c. Grade 10 state assessment, central tendency |
| 4. The process required to analyze and present data. | c. apply the appropriate statistical measures including central tendency, variability, and correlation to a situation (NCTM Standard 10; MO 1.2, 1.5, 3.2) | 4. Grade 10 state assessment    d. Grade 10 state assessment<br><br>5. Grade 10 state assessment |
| 5. The appropriate use of technology. | d. investigate the effects of data transformations on variability and measures of central tendency (NCTM Standard 10; MO 1.1, 1.4, 2.7) | |

| What All Students Should Know | What All Students Should Be Able To Do | Tenth Grade Assessment Notes |
|---|---|---|
| | **e.** investigate the concept of a random variable (NCTM Standard 10; MO 1.4, 2.7, 3.2) | |
| | **f.** design and interpret simulations to estimate probabilities (NCTM Standard 11; MO 1.3, 3.3, 3.6) | Do |
| | | e.  Grade 10 state assessment |
| | **g.** apply theoretical probability to real-world problems (NCTM Standard 11; MO 1.7, 3.8) | f.  Grade 10 state assessment |
| | | g.  Grade 10 state assessment |
| | **h.** apply experimental probability to real-world problems (NCTM Standard 11; MO 1.7, 3.8) | h. Local assessment |
| | | i.  Beyond 10" grade state assessment |
| | **i.** collect, plot, and interpret data, including that from a discrete probability distribution (NCTM Standard 11; MO 1.2, 1.6, 3.6) | j.  Beyond 10" grade state assessment |
| | | k.  Grade 10 state assessment |
| | **j.** develop, interpret, and apply the normal curve in problem solving (NCTM Standard 11; MO 1.1, 3.2, 3.4) | l.  Beyond 10th grade state assessment |
| | k  determine and interpret maximum and minimum values within a data set, on a graph, or in a problem situation (NCTM Standard 13; MO 1.3, 2.1, 3.6) | |
| | l.  analyze an infinite series as it relates to a limiting value (NCTM Standard 13; MO 1.6, 1.8, 3.2) | |